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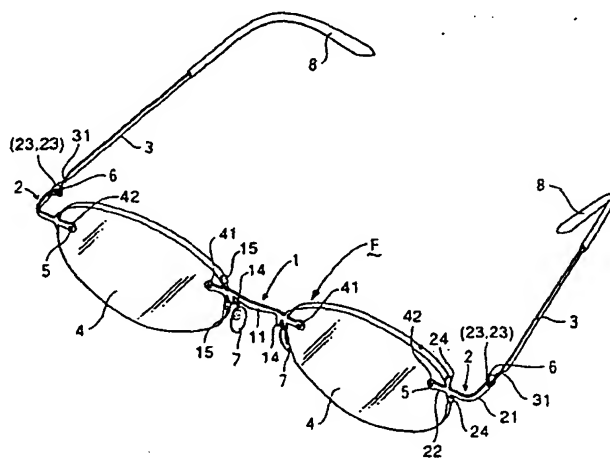
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(75) Inventor/Applicant (for US only): INATDA, Syuichi  
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(54) Title: RIMLESS SPECTACLES WITH BENT METALLIC PARTS IN USE AND THE SAME PARTS



(57) Abstract: This invention is to provide a pair of rimless spectacles which can be efficiently assembled not by means of such troublesome metal joint work as brazing, but by means of a simple plating work and which is light in weight and comfortable to wear while keeping its metallic strength and high-grade appearance intact, and the bent metallic parts to be used for assembling such spectacles. That is to say, this invention is characterized in that such structural parts of the spectacles as bridge and endpiece are arranged so that they can be inexpensively prepared by means of such a simple plating work on a thin metallic plate as blanking, which bridge and endpiece are then used to connect the lenses in symmetrical juxtaposition with regard to each other so as to provide a front frame, onto the bracket endpieces of which frame, the temples are hinged, thereby, such rimless spectacles as being light in weight and sophisticated in design being assembled in an easy and inexpensive way.

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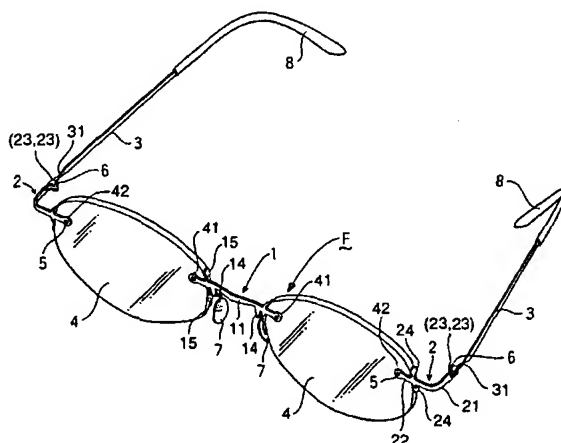
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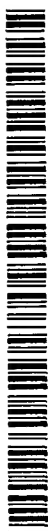
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## DESCRIPTION

### RIMLESS SPECTACLES WITH BENT METALLIC PARTS IN USE AND THE SAME PARTS

#### TECHNICAL FIELD

This invention relates to rimless spectacles with bent metallic parts in use and the same parts, in more details, pertaining to such spectacles that is easy to be assembled with such structural parts inexpensively prepared by such a simple plating work on a thin metallic plate as blanking, nonetheless, which spectacles is light in weight and sophisticated in design.

#### BACKGROUND ART

Conventionally, a pair of spectacles is well known as rimless spectacles wherein a front frame is provided by clamping a pair of right-and-left lenses in juxtaposition onto the lens straps provided on the respective ends of the bridge and the outer circumferential sides of the respective lenses are held onto the lens straps of the bracket endpieces while the temples are foldably hinged onto the distal end portions of said endpieces. The prior references of such spectacles are made to Figures 10 and 11 of the Approved Japanese Patent Application Advertisement No.1-60128, Figure 1 of the Japanese Utility Model Application Laid-open No.62-35324, Figures 1 and 3 of the Japanese Patent Application Laid-open No.8-136866 and to the definition of the relevant term listed at an item No. 105 of JIS (Japanese Industrial Standard) CLASSIFICATION CODE No.B7280 and its accompanying drawing No. 5.

Such type of spectacles is wide in view and provides clear vision to the wearers, as it does not require the rims enclosing the right-and-

left lenses. Moreover, as it is assembled with small metallic parts besides the lenses, its streamlined and sophisticated design is popular among the younger wearers. Such parts as the bridge, bracket endpieces of the rimless spectacles are required to be strong enough to directly sustain a pair of lenses with engaged thereto and to allow its whole weight to be carried on the temples while high-grade appearance is also sought-after, so that they are normally made of metallic material.

However, the bridge normally requires pad arms to mount nose pads thereon and rim pad portions to support the inner circumferential fringe sides of the lenses, besides lens straps to be provided with the respective ends thereof to sustain the lenses with engaged thereto, so that brazing operation is indispensable to incorporate those structural elements into the bridge, which leads to inefficiency in production and high production cost. This also applies to the bracket endpiece, at the distal end portion of which hinge pieces have to be provided to hinge a temple thereon. Moreover, a rim pad portion has to be provided therewith to support an outer circumferential fringe side of the respective lenses. As such, brazing operation is indispensable for this part too. It leads to inefficiency in production and high cost of production. Recently, although the bridge and bracket endpiece of synthetic resin are integrally formed by injection molding, they look inferior to those in metal, so that it does not suit the taste of especially the fashion-conscious wearers.

In view of the inconveniences encountered with such conventional rimless spectacles, this invention is to provide a novel rimless spectacles with such ordinary parts as a bridge and bracket endpieces, the respective structural elements of which are integrally formed of metal by means of such a simple plating process as blanking, so that it dispenses with brazing or soldering steps to prepare such elements and

to provide bent metallic parts to be used for assembling such spectacles.

Further, this invention is to provide rimless spectacles which keeps its metallic strength and high-grade appearance intact while being light in weight and comfortable to wear and to provide bent metallic parts to be used for assembling such spectacles.

Moreover, this invention is to provide a pair of rimless spectacles which can be efficiently produced and to inexpensively provide a bridge and a bracket endpiece, which are respectively structured as bent metallic parts, to enable such production.

#### DISCLOSURE OF THE INVENTION

The means adopted in this invention to solve the above issues is described as follows with reference to the accompanying drawings.

The rimless spectacles embodied in this invention comprises a bridge made of a thin metallic plate, said bridge being integrally provided with at least one lens strap at the respective ends of a bar portion thereof and a pair of pad arms respectively extending from the vicinity of the respective ends of said bar portion and having a pad mounting portion at the tip end portion thereof, wherein said lens straps and pad arms are subjected to bending operation on a case-by-case basis; a bracket endpiece made of a thin metallic plate, a bracket portion of which is provided with at least one lens strap at its one end while at the other end thereof, a pair of knuckle plates are symmetrically provided, which plates being bent parallelwise and opposedly with regard to each other so as to form hinge pieces; a temple having a reciprocally rotatable piece which is insertable between said knuckle plates and a pair of lenses, on a portion thereof to which the lens strap of said bridge extends, a holding hole being

pened while on a portion thereof to which said lens strap of said bracket endpiece extends, a holding hole being opened, wherein a front frame is provided by abutting the lens straps of the bridge onto the adjacent holding holes of the juxtaposed lenses so as to clamp said bridge onto the lenses with holding members while by abutting the lens strap of the respective bracket endpieces onto the holding hole located in the outer circumferential fringe side of the respective lenses so as to clamp the respective endpieces onto the lenses with a holding member and each of the temples is foldably engaged to each of the endpieces by inserting its rotatable piece between said knuckle plates and axially connecting said piece and plates with a holding means.

The bent metallic parts required for realizing rimless spectacles embodied in the present invention are provided by adopting the following structural features thereof, which features are also shown in the accompanying drawings.

The bridge is made of a blanked metallic thin plate which has a bar portion of small width and is flexible to be bent, and characterized in that it is integrally provided with at least one lens strap at the respective ends of said bar portion and a pair of pad arms respectively extending below from the respective ends of said bar portion and having a pad mounting portion at their tip ends.

The bracket endpiece is made of a blanked metallic thin plate which has a bracket portion of small width and is flexible to be bent, and characterized in that it is provided with at least one lens strap at one end of said bracket portion while at the other end thereof a pair of knuckle plates are arranged in symmetrical relation to each other, which plates are bent parallelwise and opposedly with regard to each other so as to form hinge pieces.

The rimless spectacles embodied in the present invention and the

metallic parts used thereof are supplementarily explained as follows. For the bridge and bracket endpiece, it is preferable to use a thin metallic plate of high anti-corrosion and flexibility. For examples, this plate is made of  $\beta$ -titanium, Ti-Pd alloy, Cu-Ni-Zn alloy, Be-Cu alloy or stainless steel such as SUS 420J2-CSP of Japanese Industrial Standard.

The spectacle lens embodied in this invention adopts such plastic materials as diethyleneglycol bisallylcarbonate resin which is generally called as CR-39, polythionic urethane resin as published in the Japanese Patent Application Laid-open No.7-316250, metacrylate resin and polymethyl metacrylate resin. However, instead of such materials, a glass lens also will do, even though there may be some troubles to open the holding holes on the lens surface.

Next, it is preferable that a bent metallic part to form the bridge is integrally provided with rim pad portions to abut an inner circumferential fringe side of the lens in the vicinity of a root of the lens strap while that to form a bracket endpiece is integrally provided with rim pad portions to abut an outer circumferential fringe side thereof. This prevents the lenses from fluctuating at the holding holes when they are held in place only by the lens straps. Such bridge and endpiece as mentioned above are easy to be formed by blanking them out of a thin metallic plate.

It is preferable that the pad mounting portion of the pad arm is integrally formed when the bridge is blanked out of the thin metallic plate and the nose pad should be suspended or capped onto such portion.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the assembled rimless spectacles of the present invention; Figure 2 is a plan view of a blanked metallic

plate to form the bridge of the rimless spectacles embodied in this invention; Figure 3 is a perspective view of the bridge formed by bending the respective structural members of the metallic plate as shown in Figure 2 at angles; Figure 4 is a plan view of a blanked metallic plate to form the bracket endpiece of the rimless spectacles of this invention; Figure 5 is a perspective view of the endpiece formed by bending the respective structural members of the metallic plate as shown in Figure 4 at angles; Figure 6 is a plan view of the temple of the rimless spectacles embodied in this invention and Figure 7 is an enlarged perspective view of the nose pad of the rimless spectacles of the present invention and its surrounding look as seen from the ocular side of the lens.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, the rimless spectacles structured according to this invention and its bent metallic parts are concretely described below.

Figure 1 shows the assembled rimless spectacles embodied in this invention, in which reference numerals (1), (2), (3), (4), (5), (6), (7) and (8) indicate a bridge, a bracket endpiece, a temple, a lens, a holding member (bolt and nut in this example), a holding means, a nose pad and an end cover respectively.

Figures 2 and 3 show the concrete shape of the bridge (1) of the rimless spectacles embodied in the present invention. That is to say, it is made of a thin  $\beta$ -titanium plate having 0.7 mm in thickness by blanking it out of the same so as to be formed into substantially  $\pi$  shape as a whole. On the respective sides of its bar portion (11), the respective lens straps (12) are formed extensibly from said sides. At the tip end of the respective straps, a retaining hole (12a) is opened. From the respective ends of the bar portion, a pad arm (14) extends



below with a pad mounting portion (13) of horseshoe shape provided at its tip end. A nose pad as described below is suspended onto said mounting portion. In the present embodiment, a pair of rim pad portions (15) to be abutted onto inner fringe side surfaces of the lenses (4) are symmetrically disposed in the vicinity of a root of the respective lens straps with interposing the bar portion therebetween. To note, those rim pad portions are formed together with the bar portion, lens straps, retaining holes, pad mounting portions and pad arms when the bridge is blanked out of said  $\beta$ -titanium thin plate.

Figures 4 and 5 show the concrete shape of the bracket endpiece to be used for assembling the rimless spectacles embodied in this invention. This endpiece is also made of said  $\beta$ -titanium thin plate having 0.7 mm in thickness by performing blanking operation thereon. A lens strap (22) is formed on one end (extending towards the lens) of said bracket endpiece while on the other end thereof a pair of knuckle plates (23) and (23) are symmetrically formed with interposing the bracket portion therebetween. Those knuckle plates are formed into hinge pieces (23) and (23) by bending said plates parallelwise and opposedly with regard to each other with placing a gap therebetween along the axial center of the bracket portion, as shown in Figure 5. In the drawings, reference numeral (23a) indicates an aperture to receive a holding axial means as described below while reference numeral (23b) indicates a slit formed to adjust a gap between said knuckle plates when they are formed into hinge pieces. In this embodiment, a pair of rim pad portions are symmetrically provided at a root of the lens strap (22) with interposing the bracket portion therebetween, which portions are to be abutted onto the outer circumferential fringe side surfaces of the lens. This rim pad portion is also formed together with the bracket portion, lens straps (22), a pair of knuckle plates (23), apertures

(23a) and slit (23b) when the bracket endpiece is blanked out of said  $\beta$ -titanium thin plate.

Figure 6 shows the concrete shape of the temple (3) to be used for assembling the rimless spectacles embodied in this invention. In this embodiment, it is also made of said titanium plate having 0.7 mm in thickness by performing blanking operation thereon. The temple as shown in the drawing is integrally provided with a reciprocally rotatable arcuate piece (31) on the side surface of the proximal end thereof, at the center of which an aperture (31a) to receive a holding axial means as described below is opened. On the other hand, on the distal end thereof, an end cover (8) is mounted as shown in Figure 1.

With a pair of lenses (4) to be used for assembling the rimless spectacles embodied in this invention, a plastic lens cast of diethyleneglycol bisallylcarbonate resin is cut into a shape as shown in Figure 1. A holding hole (41) is bored on a portion of the respective lenses to which the lens strap (12) extends while a holding hole (42) is bored on a portion thereof to which the lens strap (22) extends.

The rimless spectacles incorporating the above structural parts is assembled as follows. A front frame (F) is provided by coinciding the respective lens straps (12) of the bridge as bent into a shape as shown in Figure 3 with the respective holding holes (41) and clamping the respective lens straps with a holding member (5) such as a bolt and nut. With the bracket endpiece, hinge pieces (23) are formed by twisting the opposed roots of the slit (23b) so as to bend the upper and lower knuckle plates parallelwise and opposedly with regard to each other with placing a gap therebetween. The practically middle part of the bracket portion is bent to define an "L" shape. The bracket endpieces, on which such bending operation has been performed, are engaged to the lenses by coinciding the lens straps (22) with the

holding holes (42) so as to connect them with a holding member (5) such as a bolt and nut. The temple (3) is foldably disposed to the ocular side of the front by inserting its reciprocally rotatable piece (31) between said hinge pieces (23) and connecting those pieces with a holding axial means (6) such as a rivet.

Upon the completion of the basic structure of the rimless spectacles as mentioned above, the rim pad portions (15) and (24) are twisted so that they abut onto the inner and outer circumferential fringe side surfaces of the respective lenses to hold them in place. Then, the pad arm (14) is twisted so that it suits a wearer's nose, onto the pad mounting portion (13) of which, the nose pad (7) is suspended as shown in Figure 7. Moreover, a twisted portion (31) is formed on the proximal end of the temple so that its upper and lower flat surfaces as originally blanked out are raised up, and onto the free end portion thereof, an end cover (8) is mounted. In such manner, the assembly of the rimless spectacles embodied in this invention is completed.

(MODIFIED EXAMPLES)

The concrete example of the present invention is practically disclosed as described above, but it is not limited to the above embodiment. It should be understood that it can be modified in various manners within the scope of the accompanying claims.

For examples, the bar portion (11) at the respective ends thereof and the bracket endpiece at one end thereof have only one lens strap (12) and (22) respectively, so that the respective lenses are clamped at the holding holes (41) and (42) by the sole lens strap (12) of the bridge and that of the endpiece respectively. It may be well that the inner and outer fringe side surfaces of the respective lenses are each supported at two points as shown in Figure 1 of the Japanese Utility Model Application Laid-open N.62-35324 by forming the lens straps (12)

and (22) respectively into forked shape. This dispenses with the rim pad portions to be abutted at the inner and outer fringing side surfaces of the respective lenses, nonetheless, which still enables the lenses to be held in a stable manner. It is needless to say that such modified example belongs to the technical scope of the present invention.

In the above embodiment, the practically middle part of the bracket portion (21) is bent into an "L" shape so that the hinge pieces are extended towards the ocular side of the respective lenses, but it is not necessary to bend the same into such shape. It may be well that the bracket portion is made shorter so as to cause the hinge pieces to project from the respective sides of the front, onto which pieces the temple is hinged. This modification also belongs to the technical scope of the present invention.

Further, in the above embodiment, although it is shown that a joint plug of the nose pad is inserted into the enclosure of the pad mounting portion (13) of horseshoe shape so as to be suspended onto the latter, it may be well that it is suspended thereto with a nose pad made of silicone rubber capped thereon. This modification also belongs to the technical scope of the present invention.

Moreover, in the above embodiment, although it is shown that the temple is blanked out of a thin metallic plate, it is not necessary to use such metallic material therefor. It can be replaced with a conventionally and generally used temple, which replacement also belongs to the technical scope of the present invention.

#### INDUSTRIAL APPLICABILITY

As having been described up to here with the forgoing embodiment, the rimless spectacles embodied in this invention is assembled with a bridge and bracket endpieces which are obtained by blanking them out of

a thin metallic plate and in which bending operation is performed, so that it weighs light and is comfortable to wear in use while keeping its metallic strength and high-grade appearance intact. Moreover, the respective structural elements of such metallic parts as mentioned above are integrally provided, so that it dispenses with brazing or soldering, which improves productivity and reduces production cost.

The rimless spectacles embodied in the present invention incorporating the above bent metallic parts is so flexible and light in weight to wear that it gives no trouble to the wearers even though they may put it on for a long time.

According to the present invention, the problems encountered with the prior arts are completely solved, and practically and economically speaking, it surpasses over the conventional rimless spectacles, so that its industrial applicability is very high.

## CLAIMS

1. Rimless spectacles with bent metallic parts in use comprising:

a bridge (1) made of a thin metallic plate and integrally provided with at least one lens strap (12) at the respective ends of a bar portion (11) thereof and a pair of pad arms (14) respectively extending below from the vicinity of the respective ends of said bar portion, said pad arms respectively having a pad mounting portion (13) at their tip ends, wherein said lens strap and pad arms are subjected to bending operation on a case-by-case basis;

a bracket endpiece (2) made of a thin metallic plate and provided with at least one lens strap (22) at one end of a bracket portion (21) thereof while provided with a pair of knuckle plates (23) and (23) at the other end thereof in a symmetrical relation to each other, said plates being bent parallelwise and oppositely with regard to each other so as to be formed into hinge pieces (23) and (23);

a temple (3) having a reciprocally rotatable piece (31) which is insertable between said hinge pieces;

a pair of lenses (4), the respective lenses being provided with a holding hole (41) in a portion thereof to which the lens strap (12) extends while provided with a holding hole (42) in a portion thereof to which the lens strap (22) extends,

wherein a front frame (F) is provided by abutting the respective lens straps (12) onto the respective holding holes (41) so as to clamp said bridge onto said pair of lenses with holding members (5) while by abutting the respective lens straps (22) onto the respective holding holes (42) with the hinge pieces directed towards the ocular side of the respective lenses so as to clamp the respective bracket endpieces (2) onto the respective lenses with said holding members, and the respective temples (3) are foldably connected to the respective

endpieces by inserting said rotatable piece between said hinge pieces and axially supporting those pieces with a holding means (6).

2. Rimless spectacles according to claim 1 wherein the lens strap (12) in the vicinity of its root is integrally provided with rim pad portions (15) to be abutted onto an inner circumferential fringe side of the respective lenses while the lens strap (22) in the vicinity of its root is integrally provided with rim pad portions (24) to be abutted onto an outer circumferential fringe side of the respective lenses.

3. Rimless spectacles according to claims 1 or 2 wherein said bridge, bracket endpiece and temple are respectively made by blanking them out of a thin metallic plate.

4. Rimless spectacles as in any one of the preceding claims wherein said bridge, bracket endpiece and temple are respectively made of a titanium thin plate.

5. Bent metallic parts wherein a bridge having a bar portion (11) of small width thereon is made of a blanked metallic thin plate which is flexible to be bent, said bridge being integrally provided with at least one lens strap (12) at the respective ends of said bar portion and a pair of pad arms (14) respectively having a pad mounting portion (13) at their tip ends, which arms extend below from the vicinity of the respective ends of said bar portion.

6. Bent metallic parts according to claim 5 wherein the rim pad portions (15) to be abutted onto an inner circumferential fringe side surface of the respective lenses are integrally provided in the vicinity of the respective lens straps (12).

7. Bent metallic parts wherein a bracket endpiece (2) having a bracket portion (21) of small width thereon is made of a blanked thin metallic plate which is flexible to be bent, said endpiece being integrally provided with at least one lens strap (22) at one end of

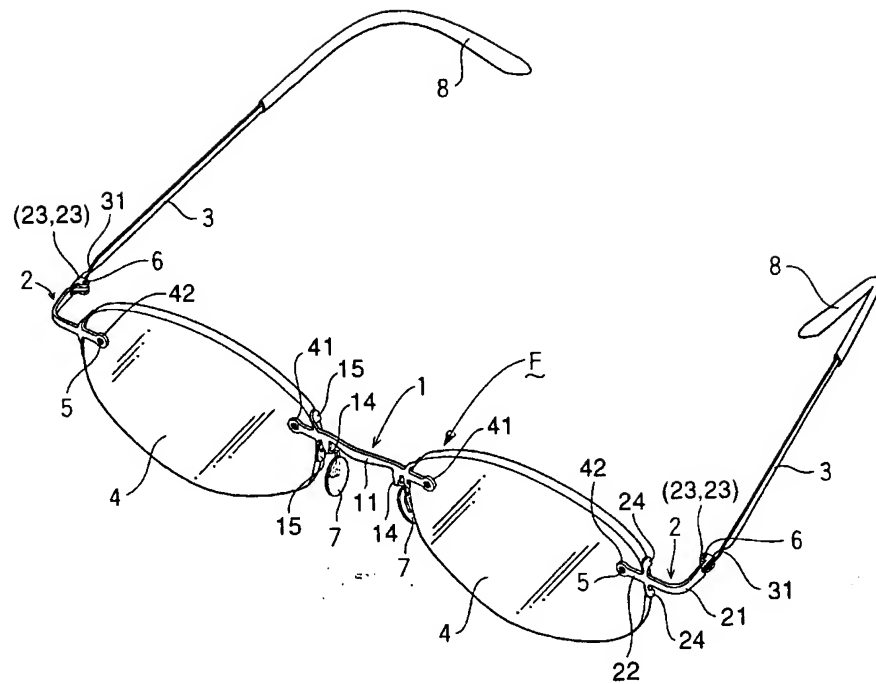
said bracket portion while at the other end thereof being provided with a pair of symmetrically positioned knuckle plates (23), which plates are bent parallelwise and opposedly with regard to each other so as to be formed into hinge pieces (23) and (23).

8. Bent metallic parts according to claim 7 wherein rim pad portions (24) to be abutted onto an outer circumferential fringe side surface of the respective lenses are integrally provided in the vicinity of the lens strap (22).



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Fig. 1



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Fig. 2

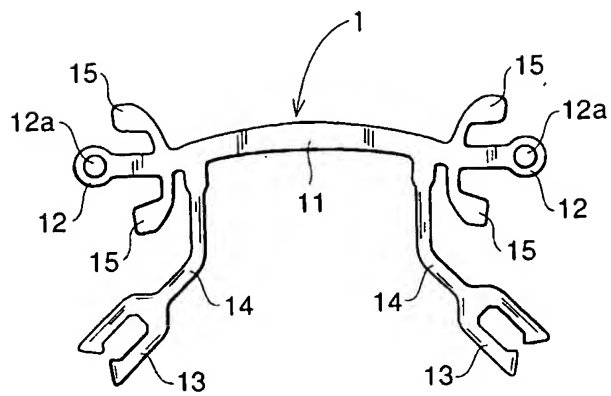
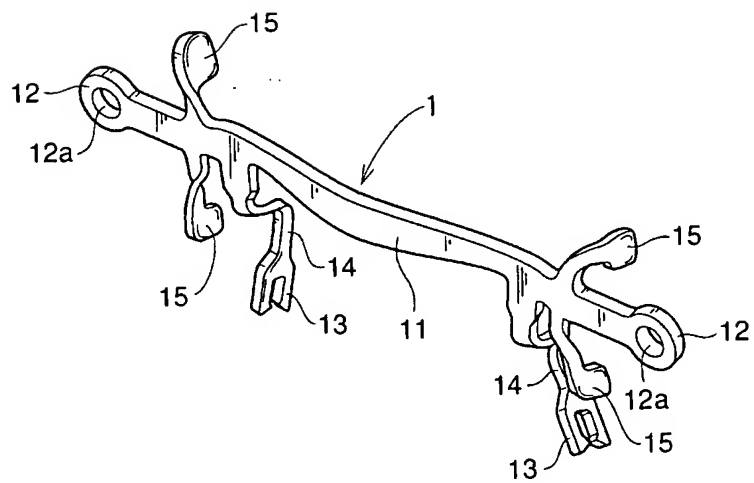


Fig. 3



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Fig. 4

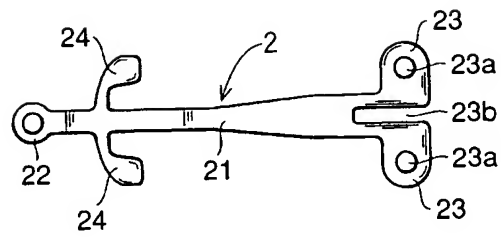
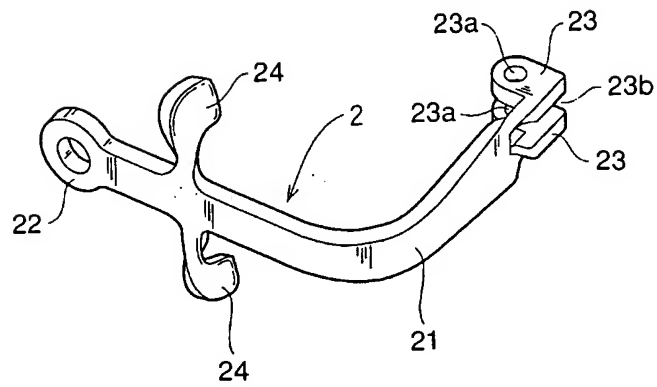
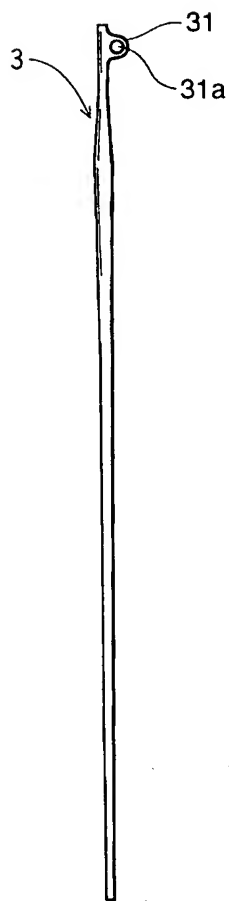


Fig. 5



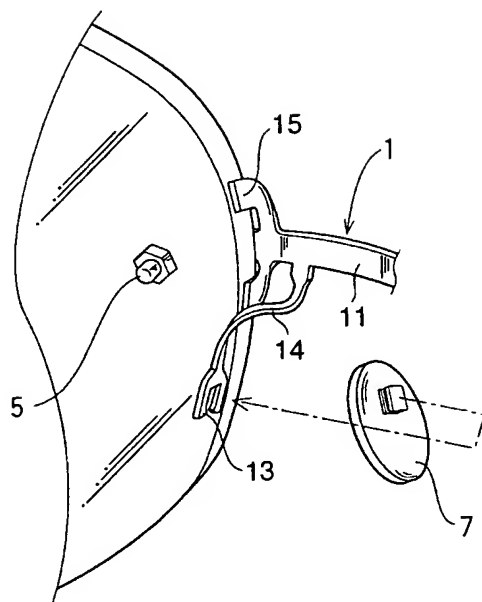
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*Fig. 6*



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Fig. 7



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 99/07064

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G02C1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 1 387 898 A (H. NEWBOLD) 16 August 1921 (1921-08-16) page 1, line 46 - line 69	1,3,5,6
Y	EP 0 661 576 A (KOBAYASHI MITSUO) 5 July 1995 (1995-07-05)	1,3,5,6
A	column 2, line 8 -column 3, line 31	2,7,8
A	WO 98 40779 A (TABACCHI VITTORIO ;SAFILO SPA (IT)) 17 September 1998 (1998-09-17) claims	1,2,5
A	WO 92 08158 A (HOUMAND JAN) 14 May 1992 (1992-05-14) page 5, line 13 -page 6	1,4,5
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

14 April 2000

Date of mailing of the international search report

25/04/2000

Name and mailing address of the ISA

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CALLEWAERT, H

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/JP 99/07064

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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